

# ***Community-Engaged Research and Public Health Protection: Sustaining a Program and Partnerships with Alaska Native Communities***

**Partnerships for Environmental Public Health, NIEHS  
March 7, 2012**

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Frank von Hippel, University of Alaska**



**[www.akaction.org](http://www.akaction.org)**

# Addressing health and justice issues in Alaska

## Core Values:

- **Community right-to-know**
- **Environmental justice**
- **Precautionary principle**
- **Elimination of the production and release of toxics**
- **Rights and sovereignty of Indigenous peoples**
- **Culture of caring and wellness**



- **Community-based participatory research—field and community health investigations**
- **Respond to community calls for assistance and focus on issues that have an opportunity to catalyze larger policy changes**
- **GIS computer mapping**
- **Environmental health education**
- **Environmental justice and human rights workshops**
- **Achieve policy change on local, national and international levels**





## Summary of Toxic Waste Sites in Alaska

- ◆ All ADEC contaminated sites
- Military, FAA, USCG, & Commerce
- ✚ Superfund sites
- ✕ Radioactive waste sites
- ▼ Chemical weapons dumps

- EPA Sites
- ★ NPDES (116 sites)
  - ★ CERCLA (229 sites)
  - ★ RCRA (19 sites)
  - ★ TRI (25 reported sites)

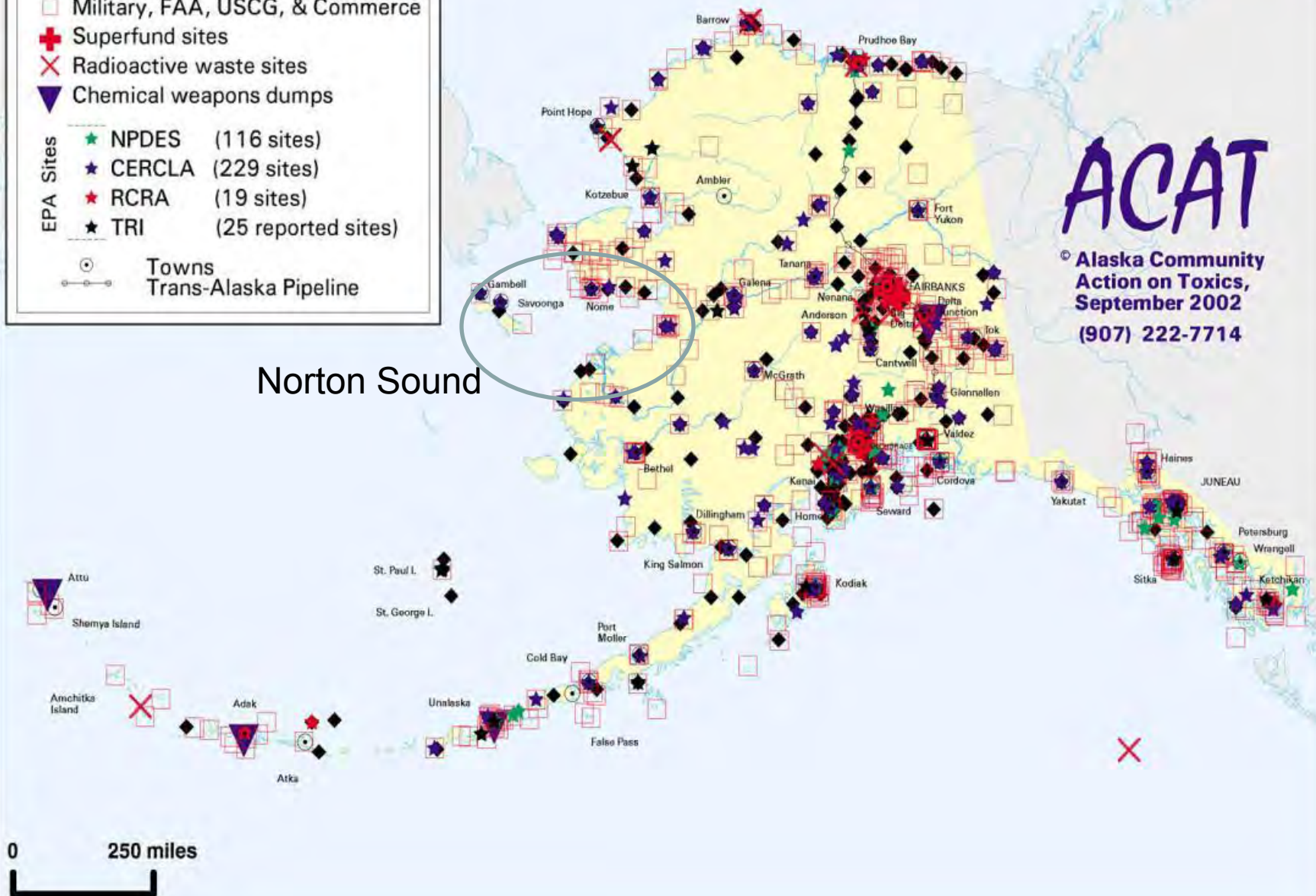
○ Towns  
— Trans-Alaska Pipeline

700 active and abandoned military sites in Alaska—Many co-located with Alaska Native villages

**ACAT**

© Alaska Community  
Action on Toxics,  
September 2002  
(907) 222-7714

Norton Sound



## **Annie Alowa**

**we remember her knowledge and  
forewarning as a respected community  
health aide and elder**

- **She was a keen and trained observer about the health of her people**
- **She observed higher rates of cancers among the people whose families lived and worked at Northeast Cape**
- **She witnessed miscarriages and low birth weight babies, especially among those families closely associated with Northeast Cape**
- **Her concerns were not taken seriously by state and federal agencies**
- **This is why we are here today**

**Average for populations in the lower-48**



# Global Transport of Persistent Chemicals into the Arctic

## THE GRASSHOPPER EFFECT AND OUT-OF-CANADA SOURCES

Source Regions for Agricultural and Industrial Contaminants

- Agricultural
- Industrial
- Dominant Air Currents
- Atlantic Water Circulation
- River discharge

Alpha-HCH  
in seawater  
ng/litre

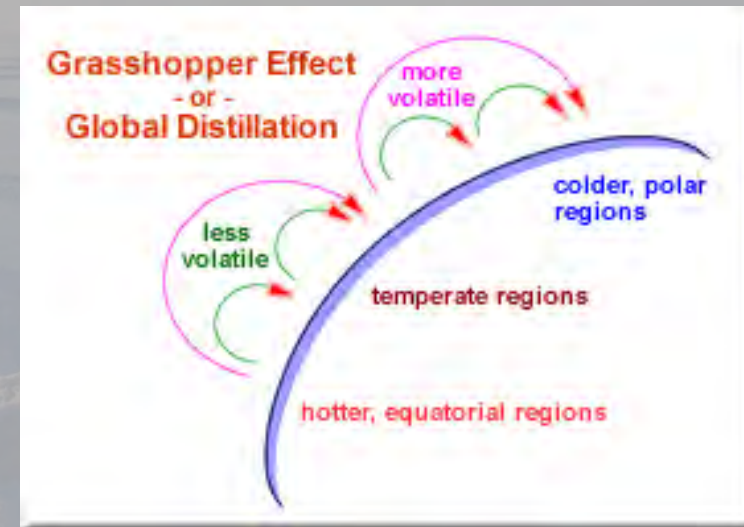
Concentrations of one HCH compound have been found to increase from south-to-north along a line from the Java Sea (off Indonesia and China) to the Beaufort Sea (AMAP, 1997).





# Contaminants in the North

- The north has become a hemispheric sink for pesticides and other industrial chemicals
- Northern food webs favor the deposition and retention of persistent, bioaccumulative toxics
- Contaminants in the north threaten the health of peoples that rely on traditional diets of fish and marine mammals
- Global warming enhances the mobilization and transport of contaminants from local and distant sources



# Body of Evidence in Alaska

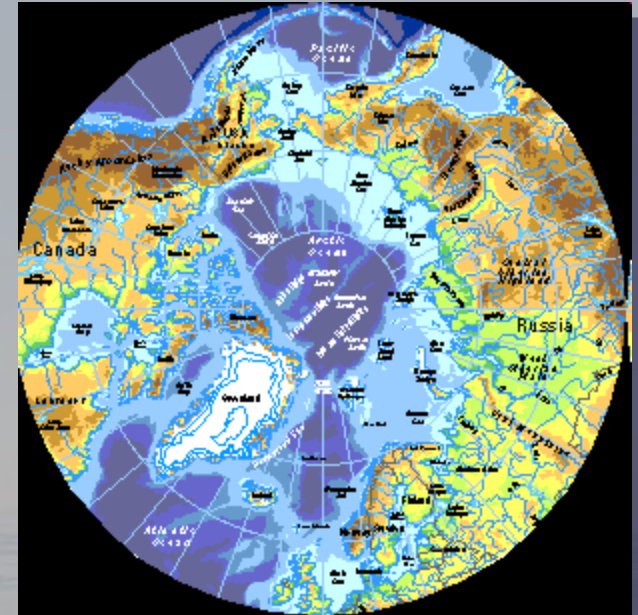
Levels of the pesticide HCH (lindane and isomers) in Bering Sea and Chukchi Sea polar bears are among the highest reported in the circumpolar Arctic.





# Current Use Chemicals in the Arctic

- Endosulfan, trifluralin, and triallate
- Chlorpyrifos
- Dacthal (herbicide)
- PBDEs doubling every 7 years in Arctic species
- Fluorinated compounds

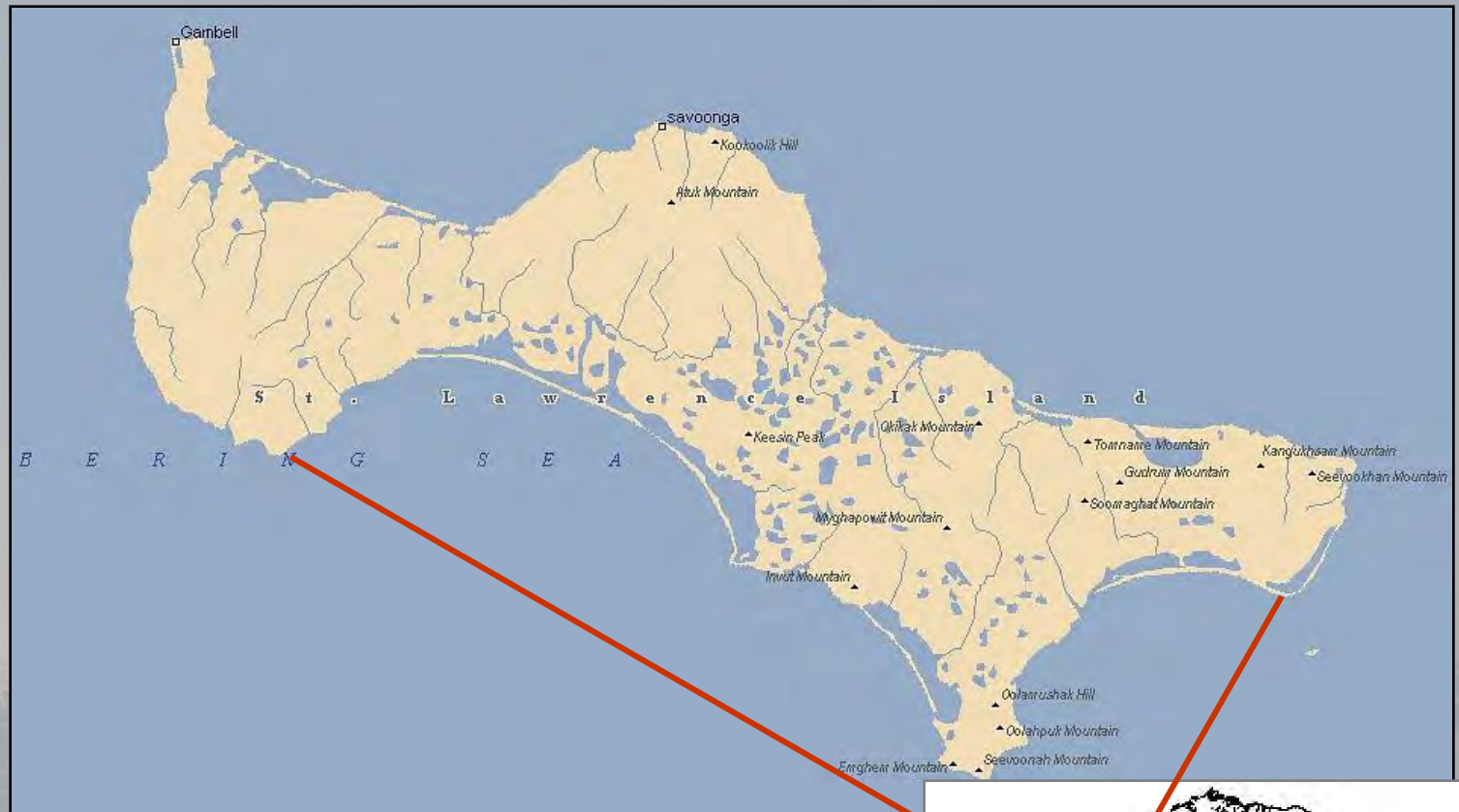


# The Language of the Stockholm Convention

- “Acknowledging that the **Arctic ecosystems and Indigenous communities** are particularly at risk...”
- “Conscious of the need for **global action...**”
- “Acknowledging that **precaution** underlies the **concerns...**”
- “Determined to **protect human health and the environment...**”



# Where is St. Lawrence Island?



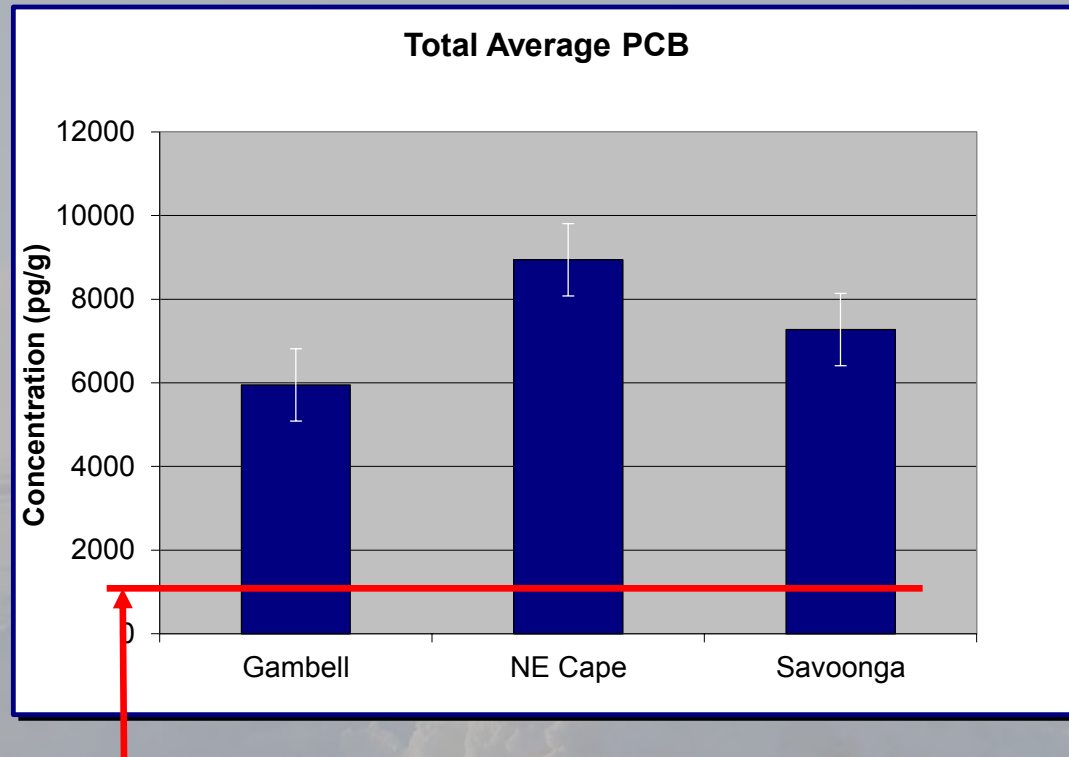
Located in the northern Bering Sea, between the Chukotkan Peninsula of Russia and the U.S. mainland





# PCBs in Blood Serum of St. Lawrence Island People

- Levels of PCBs in the blood of St. Lawrence Island Yupik people **6-9 times higher** than average in lower-48 populations
- Evidence of PCBs accumulating in the Arctic via global transport
- Military contamination also a significant source
- Published in the *International Journal of Circumpolar Health* (Carpenter et al., 2005)



*Average for populations in the Lower 48*

# Community-based Research on St. Lawrence Island, Alaska

- Elder interviews
- Bird eggs (murre)
- Human blood serum
- Air (PCBs, pesticides)
- Groundwater (VOCs)
- Surface water (PCBs, PAHs, pesticides)
- Edible plants (PCBs, pesticides)
- Sediment cores (PCBs, pesticides, trace metals)
- Traditional foods
- Community health survey (~700 completed)



# Disease Patterns Observed on St. Lawrence Island

- Cancers
- Thyroid disease
- Diabetes
- Heart disease
- Low birth weight babies, premature births, still births, miscarriages
- Other reproductive health problems





# Specific Aims for Environmental Health and Justice for Norton Sound, Alaska Project

- Identify sources of contaminants, including those from military and long-range, atmospheric sources
- Describe past and current health problems
- Increase the capacity of the health care system in Norton Sound to properly diagnose and treat health effects linked with environmental contaminants
- Work toward responsible cleanup of contaminated sites and prevent new sources of contaminants
- Assist Norton Sound communities in securing training and tools needed to establish independent programs operated by the villages to monitor contaminants





# Environmental Health Programs



- Training for community health and field researchers
- Community-based Institute
- Quarterly seminars for Village Health Aides & other health care professionals
- Environmental Health Care Toolkit
- Collaborative on Health and the Environment—Alaska



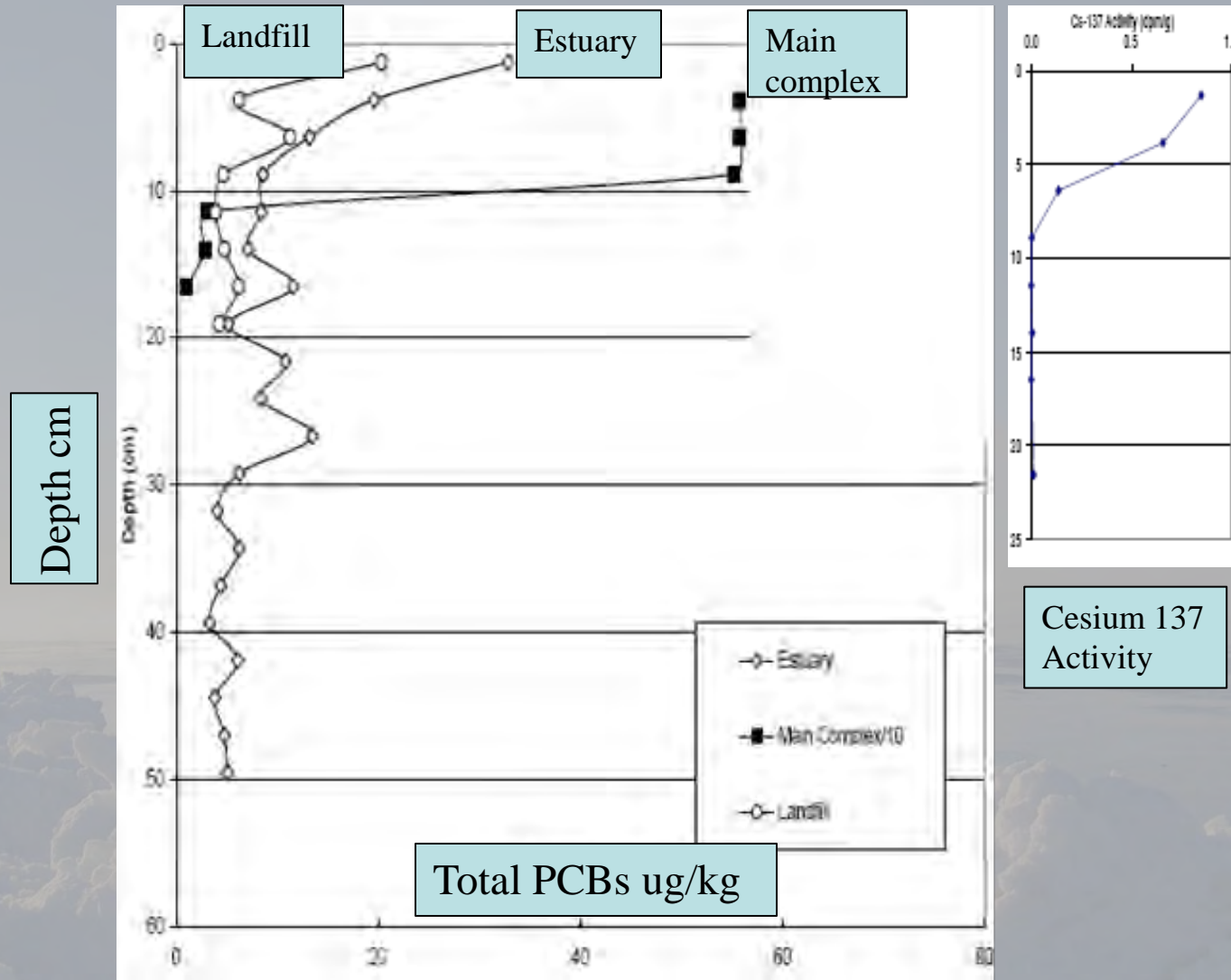
*(above) Morgan Apatiki, Community Health Researcher from Gambell, AK, collecting food samples for our Traditional Food Study*

*(upper right) Student testing water quality in Nome, AK during Field Institute*

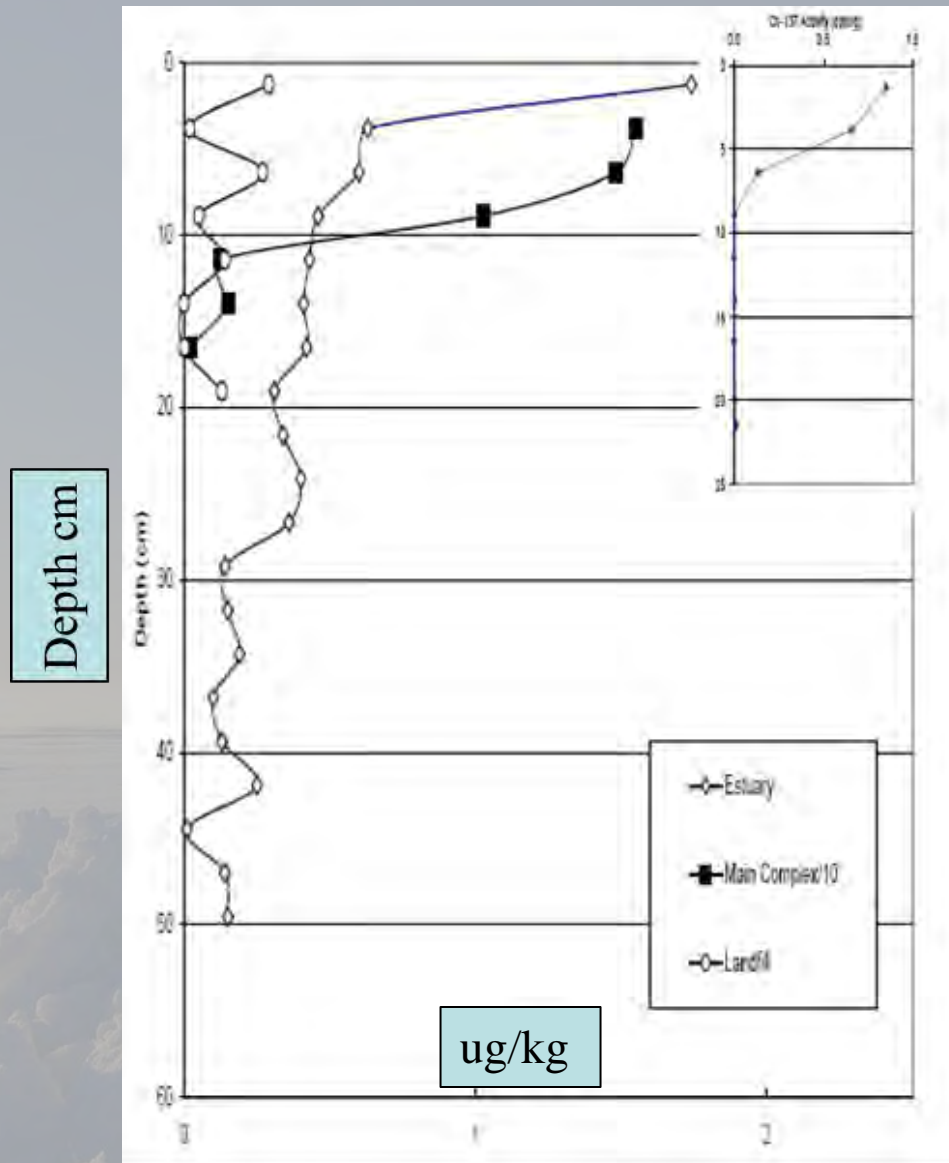
*(right) Field sampling in Elim*



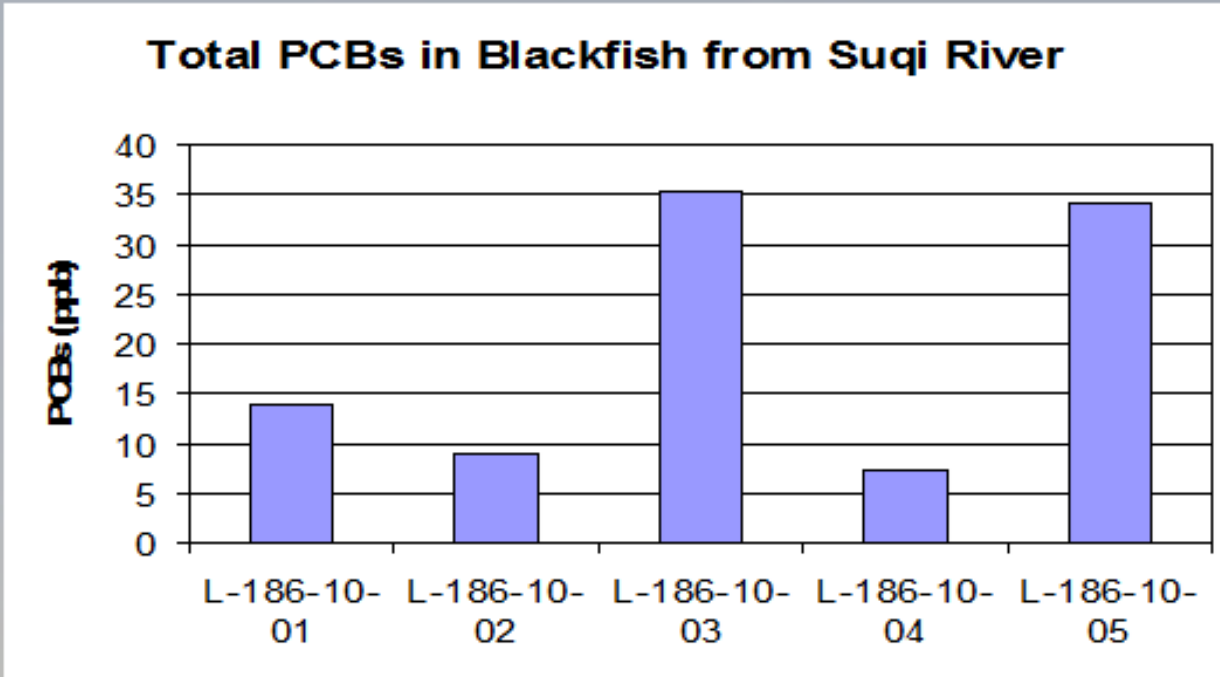
# Sediment Core Data—PCB Contamination at Northeast Cape Indicates Military Source and Incomplete Remediation



# Mirex sediment core concentrations in the Suqi Estuary, Main Complex and landfill (Site 7) sediment cores at Northeast Cape



# Blackfish Samples from the Suqi River at NE Cape on St. Lawrence Island, AK



5 blackfish from Suqi River, range from 7-35 ppb  
total PCBs ng/g ww (ppb)



THE BLACKFISH OF ALASKA.

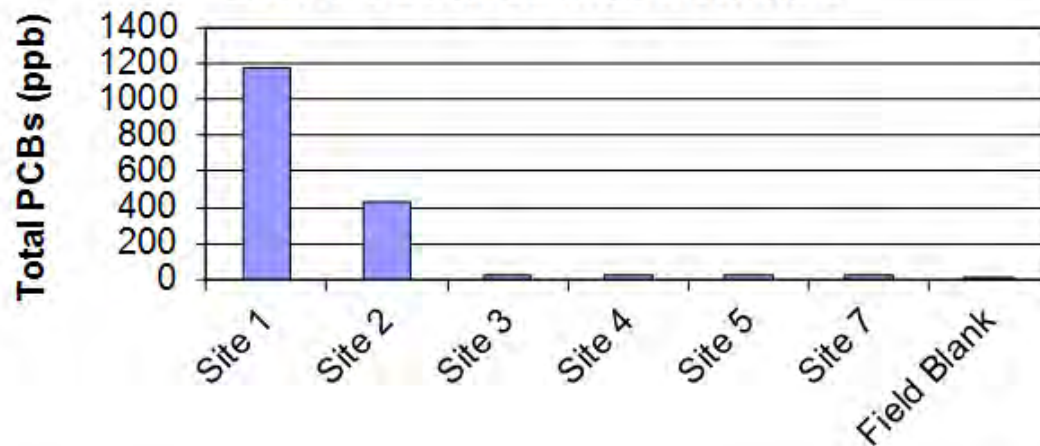
*Dallia pectoralis*, Bean. (p. 100.)

Drawing by H. S. Todd from No. 3946 A. U. S. National Museum, collected at Saint Michaels, Alaska, February, 1877, by L. M. Turner.



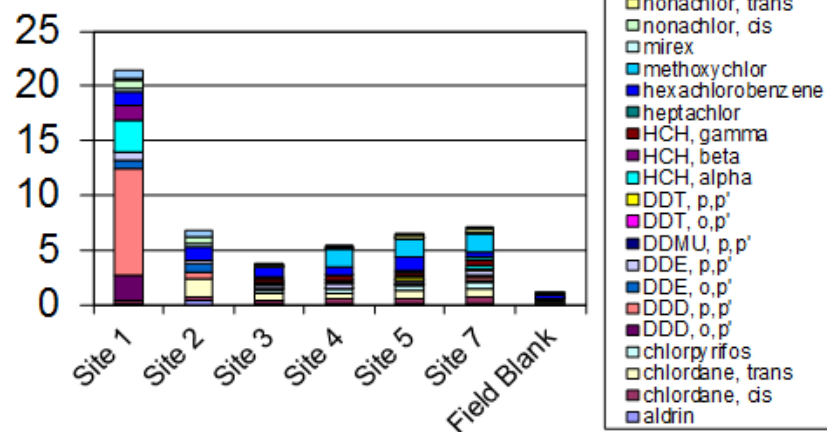
# Contaminants in Semi-Permeable Membrane Devices (SPMDs) from the Suqi River

## 2007 PCBs in SPMDs from NEC



## 2007 Organochlorine Pesticides in SPMDs from NEC

Total Organochlorine Pesticides (ppb)



Chukotka  
(Russian Federation)



### Villages and Federal Defense Facilities in the Norton Sound Region, Alaska

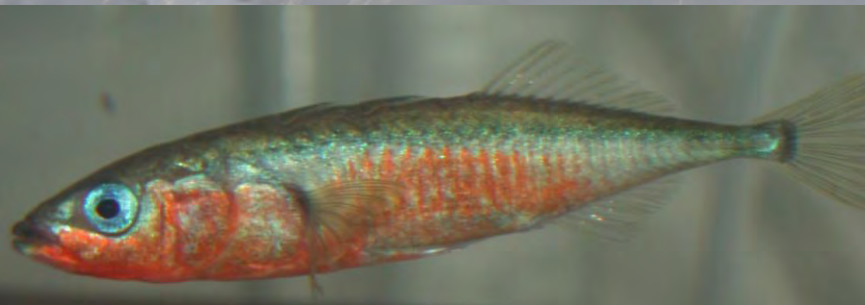
0 10 20 30 40 50 miles

#### LEGEND

- Norton Sound villages
- Major roads
- Secondary roads
- Sites from 1890-1941 (Pre-World War II)
- Sites added 1940-1950
- Sites added 1950-1970, except for the White Alice, "Operation NAM" and Emergency Cache sites
- Emergency caches established in the 1950s for military and civilian pilots
- "Operation NAM" proposed secret airbases not built
- White Alice radar sites

Alaska Community Action on Toxics  
January 23, 2005

26/29  
anadromous  
males expressed  
vitellogenin; 17 at  
high levels.



13/19 anadromous  
males expressed  
vitellogenin; 10 at high  
levels.



# Traditional Foods Biomonitoring Project: Methods and Results

- Community Health Researchers on St. Lawrence Island collected 300 food samples from local hunters from 2005-2009:
  - Fish, fowl, marine mammals, shellfish, reindeer
  - Meat, blubber, liver, kidney, intestines, rendered oils
  - Prepared and unprepared foods
- Samples analyzed for:
  - PCBs, mirex, DDE, HCB
- Some PCB levels higher than EPA fish consumption guidelines for cancer risk





# Results for PCBs Analysis of Traditional Foods on SLI

Results published in the  
*Journal of Toxicology and  
Environmental Health* (2011).  
74:1195-1214.

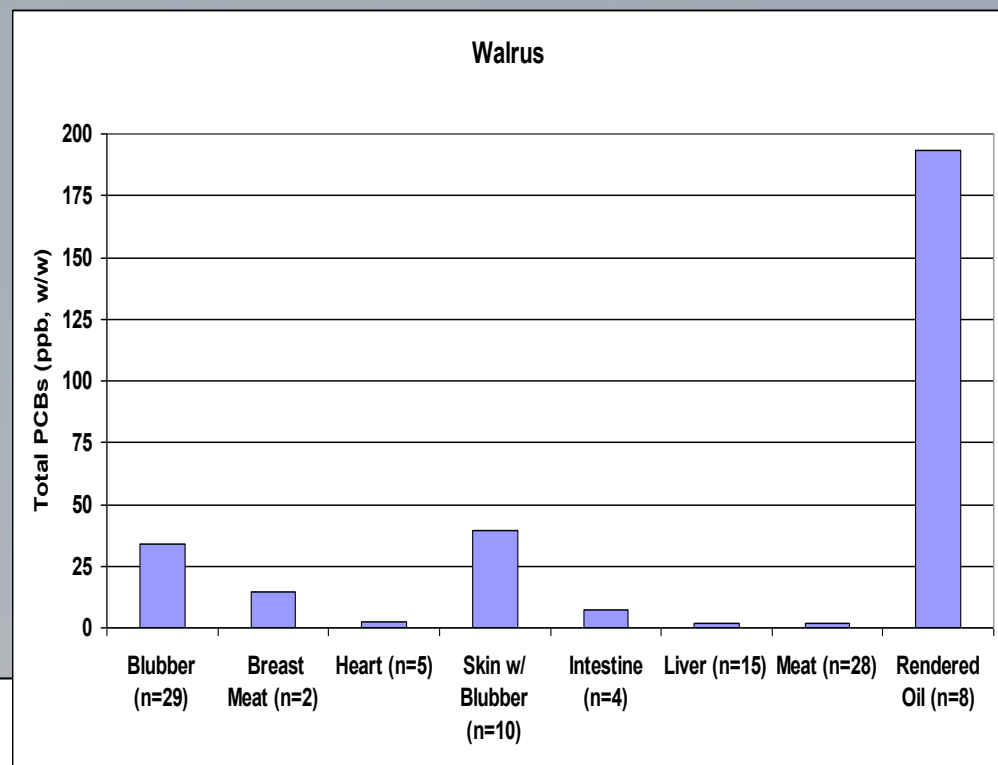
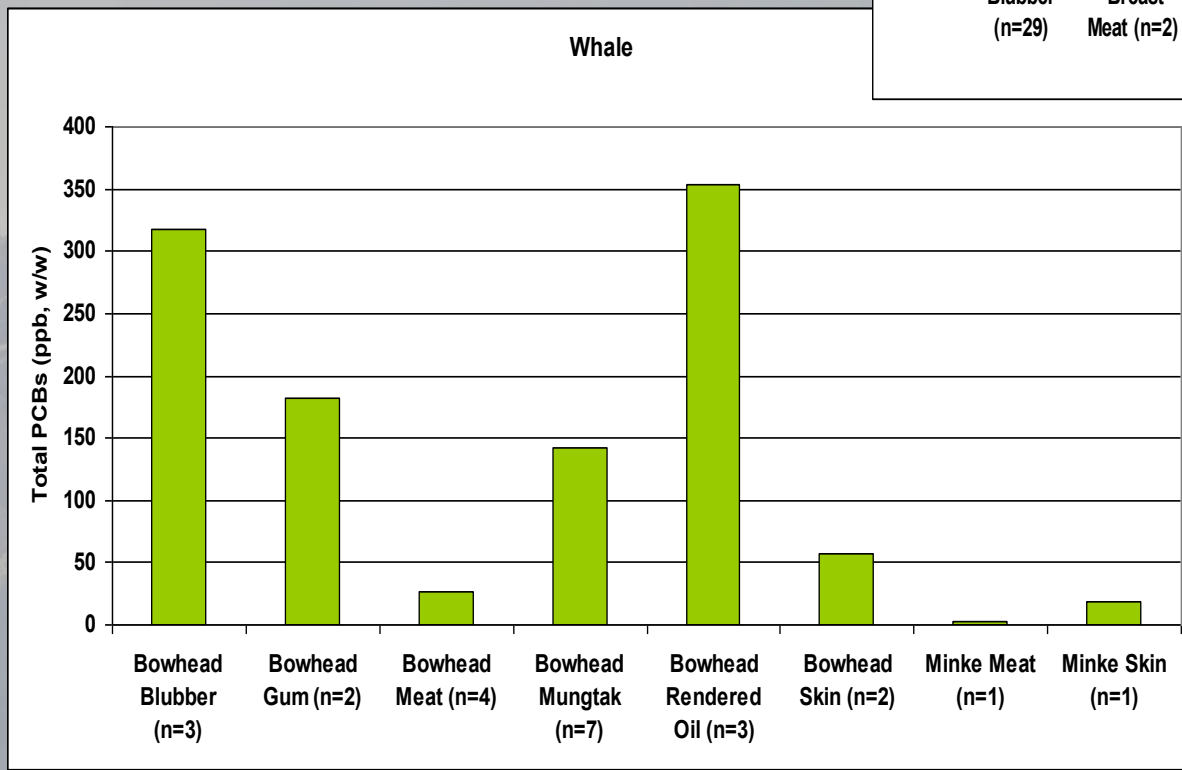
Meats — ND (Walrus) - 102.83 ppb (Bowhead)  
Fat/Blubber — 0.22 (Reindeer) ppb — 582.68 ppb (Polar Bear)  
Organs - ND (Reindeer liver, kidney) — 161.02 ppb (Bearded Seal Skin)  
Plants — 0.01 ppb (Greens) - 3.65 ppb (Salmon Berries)  
Marine Invertebrates — 0.18 ppb (Crab Meat) — 4.74 ppb (Sea Peaches/Upa)

# Rendered Oil

Range (202.6 – 451.1 ppb)

- Bowhead Whale 441.5 ppb
- Ringed Seal 451.1 ppb
- Walrus 265.4 ppb
- Spotted Seal 231.1 ppb
- Bearded Seal 202.6 ppb

\*EPA risk-based unlimited consumption limit for PCBs in fish is 1.5 ppb





# EPA Fish Consumption Guidelines for PCBs

- Unlimited Consumption for non-cancer risks (all diseases except cancer): 5.9 ppb
- Unlimited Consumption for cancer risk: 1.5 ppb

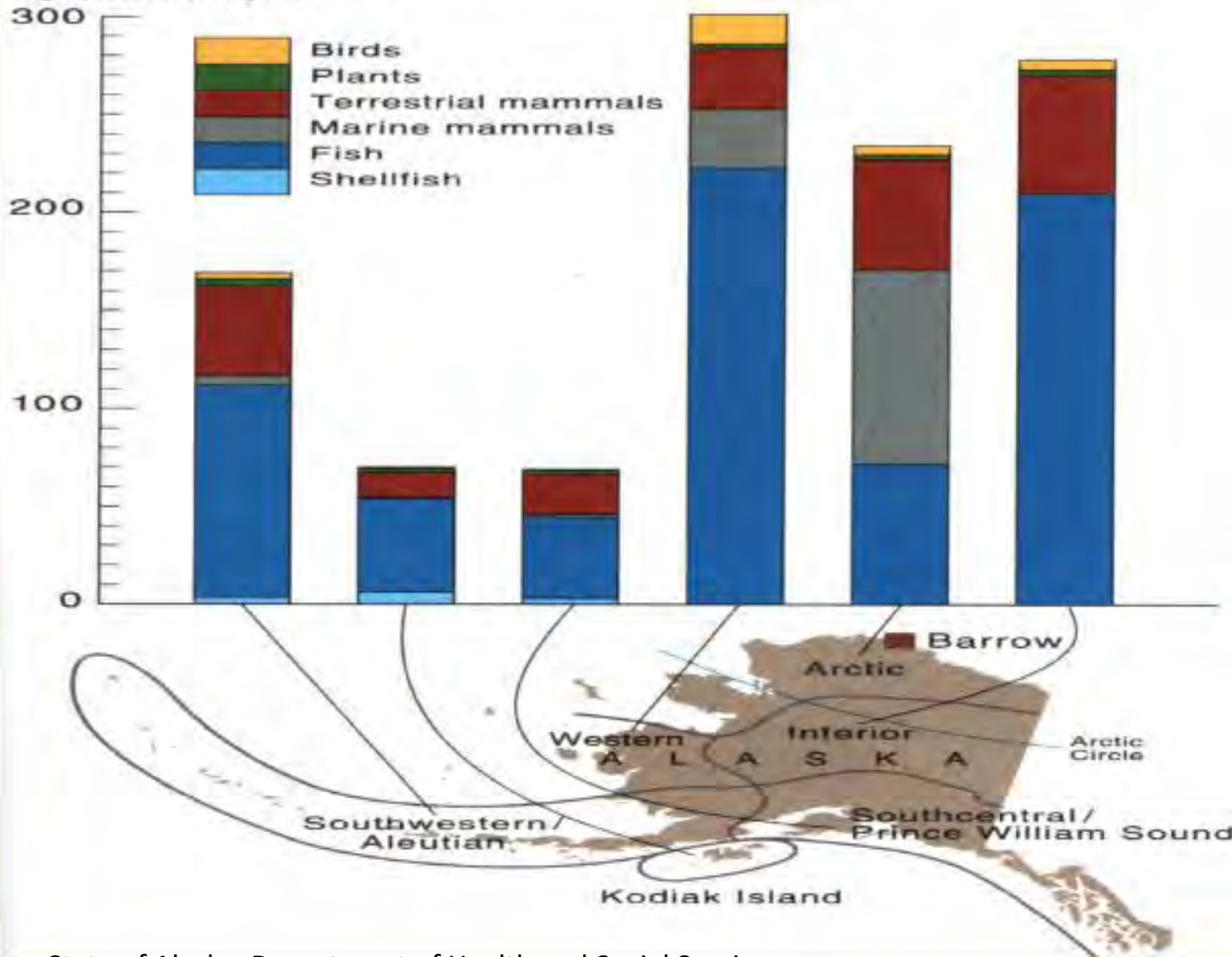
\*As the levels go higher, the EPA recommends fewer meals per month\*

Example of EPA's Guidelines

	100 ppb	300 ppb
Non cancer risk (diseases other than cancer)	No more than one meal a month	No more than one meal every other month
Cancer risk	Do not eat	Do not eat

# Alaska Traditional Foods Harvest

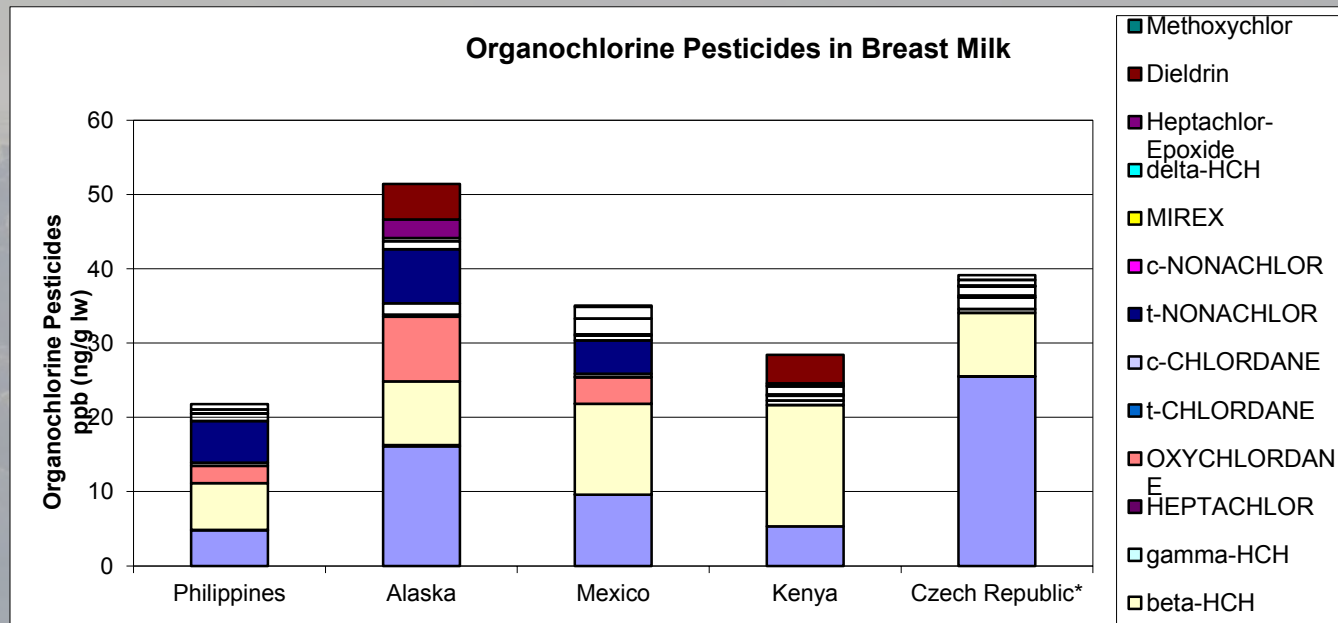
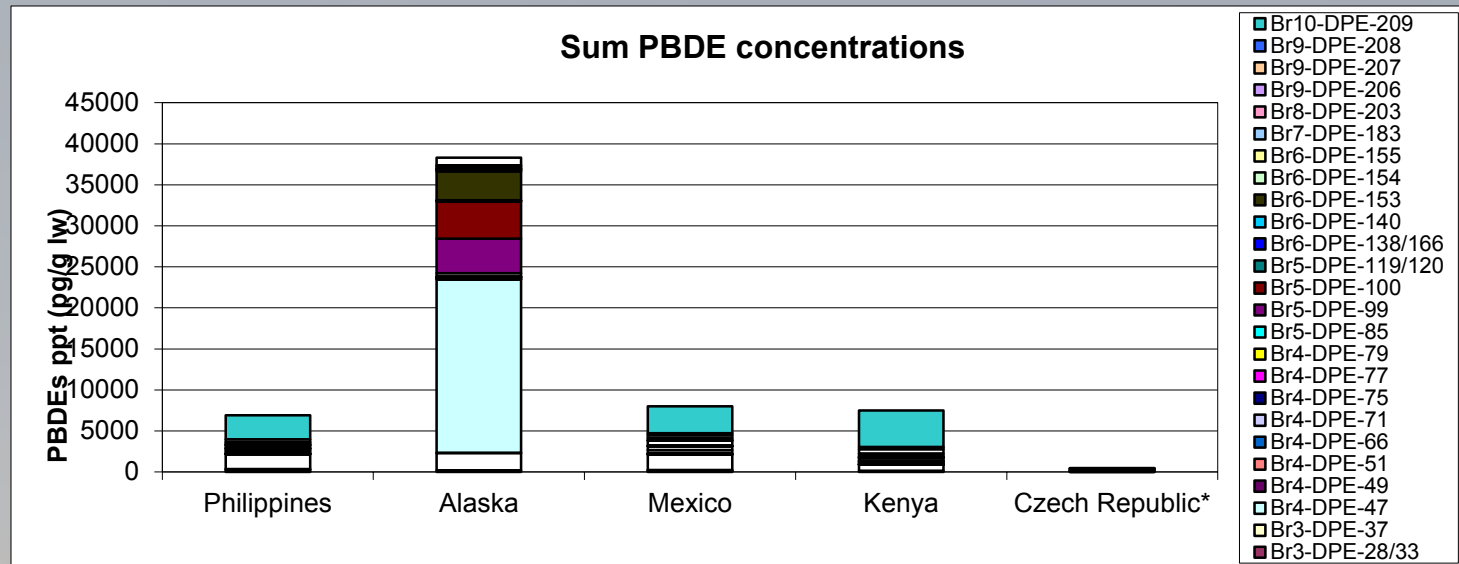
Harvest of subsistence food,  
small and mid-size communities, Alaska,  
kg/person/year



Lower 48  
mean fish  
consumption  
is 5.2 kg/yr →

From: State of Alaska, Department of Health and Social Services

# Mother Earth; Mothers' Milk; Mothers' Stories





# Implications for Public Health and Policy



**Community-based participatory research:**

- **Informs remediation decisions**
- **Ensures effective regulatory oversight and accountability**
- **Promotes environmental health through better diagnoses and treatment**
- **Influences public health policy to prevent exposures from formerly used defense sites and long-range transport**





*Field sampling during Community-Based  
Research Institute in Nome*



*Youth at the Suqi River samplin  
stickleback*



Cori Eide – Nome



Jesse Gologergen – Savoonga



Marjorie Tahbone – Nome



Blanch Okboak-Garnie (and Ellie) – Teller



Darlene Katchatag – Unalakleet





# Ecotoxicology & Environmental Health Community-Based Research Institute



Programs  
supported by  
grants from the  
NIEHS and Alaska  
INBRE





Bobby Ungwiluk – Gambell



Freida Moon-Kimoktoak – Koyuk



Toby Anungazuk, Jr. – Golovin



Debbie Anungazuk – Golovin



sediment cores  
SPMDs  
macroinvertebrates  
stickleback biomarkers

Maryann Charles – Koyuk



Clarice (Bun) Hardy – Shaktoolik



# Health of Alaska's Children

***“Alaska Native infants have a much higher rate of hospitalization for infection than any other group of U.S. infants... Prenatal exposure to contaminants, which are known to affect the developing immune system, could play a role, and that possibility is now being examined.”***

- Dr. Jim Berner, pediatrician, Alaska Native Tribal Health Consortium





# Birth Defects in Alaska

- **Data from the Alaska Birth Defects Registry shows:**
- Birth defects in Alaska are twice as high as in the United States as a whole
- Alaska Native infants have twice the risk of birth defects as white infants born in Alaska
- **Recommendations from the State of Alaska, Department of Public Health for women include:**
- Avoid contact with known or suspected environmental teratogens (agent that can cause a birth defect)



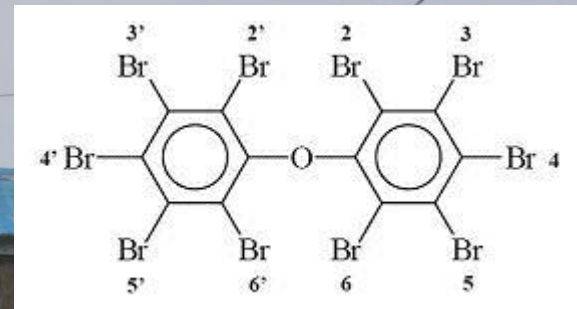
**“...even independent of differences in cigarette smoking, alcohol consumption and maternal age—which is a well-known risk factor for birth defects—Alaska Natives still have an increased risk ... that we don't really know how to explain.”**

Dr. Bradford Gessner, Maternal and Child Health Epidemiology unit

# Sustaining Community-Based Research and Policy Partnerships

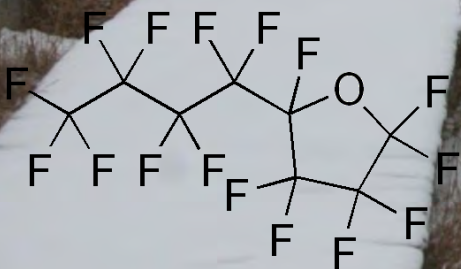
- Foundation of elder knowledge and community leadership
- Fostering collaborations with academic researchers
- Training of community health researchers
- Emphasis on community-right-to-know, capacity building and empowerment
- Community-based research Institute
- Training for health care providers
- Work on policy change with other environmental health and justice organizations





**New NIEHS-supported R01 project (2011-2016):**  
***Protecting the Health of Future Generations: Assessing and Preventing Exposures to Endocrine-Disrupting Chemicals in Two Alaska Native Arctic Communities on St. Lawrence Island***

The purpose of the proposed project is to collaborate with the two Arctic Yupik villages on St. Lawrence Island to assess multiple exposure routes of two classes of emerging endocrine disrupting chemicals—polybrominated diphenyl ethers (PBDEs) and perfluorinated compounds (PFCs), and to provide information and training to the people of SLI so that they can plan and participate in public health actions, including promoting policy changes and reducing environmental health risks





# Working toward environmental health and justice!



SLI Community Leaders, Elders, Youth, and Researchers in DC for meetings with EPA, DoD, State, and Congress



An SLI Yupik cultural presentation at Upper Senate Park



Protecting Health, Assuring Justice

[www.akaction.org](http://www.akaction.org)

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- NIEHS R01  
(2011-2016)

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- Alaska  
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Foundation
- Cedar Tree  
Foundation
- Tides  
Foundation
- True North  
Foundation

**Igamsiqayugviikamsi.  
Thank you.**